

CHAPTER 1

INTRODUCTION



**US Army Corps
of Engineers**

Sacramento District

Post-Flood Assessment for 1983, 1986, 1995, and 1997
Central Valley, California

CHAPTER 1

INTRODUCTION

The great Central Valley of California, and surrounding foothills and mountains up to the ridge tops of the Sierra Nevada and Coast Range (Figure 1-1), is located in the central portion of the state and covers more than 60,000 square miles. The Central Valley is comprised of two major valleys; the Sacramento Valley in the north and the San Joaquin Valley in the south. The Sacramento Valley encompasses an area of 26,300 square miles and is drained by the Sacramento River. The San Joaquin Valley includes the San Joaquin River Basin (16,700 square miles) which drains the northern half of the San Joaquin Valley, and the Tulare Lake Basin (17,400 square miles), an interior drainage that comprises the southern half. The Sacramento and San Joaquin River basins receive flow from multiple rivers and streams to drain a combined area greater than 43,000 square miles, most of which is on the western slope of the Sierra Nevada. They converge in the Sacramento-San Joaquin River Delta and discharge through San Francisco Bay to the Pacific Ocean. In total, more than 40 percent of the surface water in California flows through the Sacramento and San Joaquin River systems.

Over the years, floods on these two river systems have caused the loss of lives, as well as property damages. The California Department of Water Resources (DWR) has estimated that approximately 90 percent of all natural disasters in the State are flood-related, posing a greater threat to the safety of Californians than even earthquakes. Accordingly, the development, operation, and maintenance of flood management systems have been critical factors in the economic development of California.

The primary objectives of flood management are twofold: reduce loss of life and minimize the economic effects of flood-related natural disasters. Traditionally, two approaches to flood management have been applied: structural and nonstructural. The structural approach features physical structures such as dams and reservoirs, levees, and bypass channels to confine floodflows and direct the flows away from residential, municipal, prime agricultural, municipal, and industrial areas. Nonstructural approaches focus on management and institutional policies which limit and/or regulate development in floodplains, thereby keeping people away from the floodwaters.

Flood damage reduction in the Central Valley began during the initial settlement of the State in the mid-1800's with the construction of levees and bypasses and the use of natural overflow areas. As development continued, the need for additional means for managing floodflows became evident. In the early 1900's, construction of dams and reservoirs for the sole purpose of flood damage reduction, in combination with overflow and bypass areas, was proposed to the Federal Government. A later review of this proposal determined that construction of dams and reservoirs for flood damage reduction alone would not be economically feasible. However, it was recognized that multipurpose dams and reservoirs that included flood management storage, water supply, and power generation could be economically feasible.

The development of multipurpose reservoirs began in 1932 when the California State Legislature authorized the Central Valley Project (CVP). Due to the inability to secure State funding, the Federal Government later authorized and funded the CVP for construction. The CVP includes major dams and reservoirs that provide flood storage on the Sacramento, American, Stanislaus, and San Joaquin rivers. Multipurpose dams and reservoirs on other major rivers in the Sacramento and San Joaquin Valleys were constructed between the 1940's and the 1970's. In 1960, the State Water Project (SWP) was authorized by California voters to develop additional multipurpose projects. The SWP Oroville Reservoir on the Feather River provides flood management, as well as water supply, hydropower, navigation, water-related recreation, and environmental benefits to the State of California.

The completion of New Melones Reservoir on the Stanislaus River in 1980 marked the last major addition to flood management facilities in the Central Valley. Since then, the Central Valley has been subjected to four major floods (1983, 1986, 1995, and 1997) that have revealed problems in the existing system. The most significant event was in January 1997.

FLOODS OF 1997

In January 1997, Californians experienced the largest and most extensive flood disaster in the State's history. Major storms caused record flows on many rivers throughout California. In the Central Valley, the flood management systems for the Sacramento and San Joaquin rivers were pushed to capacity and beyond. Flood storage behind dams reduced floodflows by half or more, saving lives and significantly reducing property damage. However, in some areas, levees were overwhelmed. Levees on Sacramento River tributaries sustained three major breaks. Where levees performed as designed, damage from erosion was significant. On the San Joaquin River, levees failed in thirty four places. Damage to urban and agricultural lands and the cost to replace, restore, and rehabilitate flood damage reached \$524 million for the Central Valley of California.

STUDY AUTHORITY

In the House of Representatives Report (105-190) on the 1998 Energy and Water Development Appropriations Bill, Congress recognized the devastating effects of the 1997 floods and directed the Corps to conduct a comprehensive assessment of the flood management systems in the Central Valley.

Federal Study Authority

The Corps has a long history of water resource development in the Central Valley through its flood damage reduction and navigation missions. Section 306 of the Water Resources Development Act of 1990 added environmental protection as a primary Corps mission.

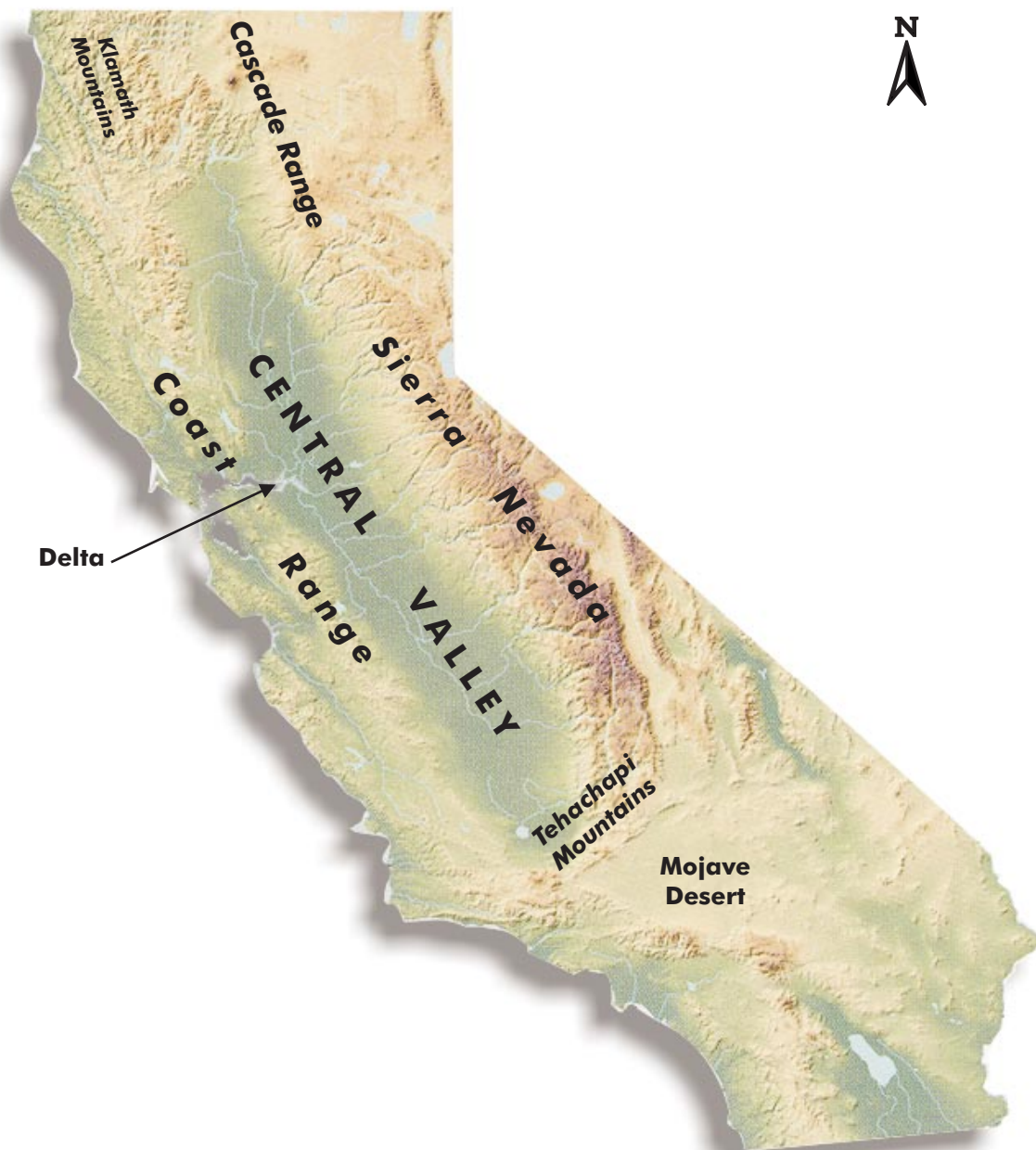
Funding for the study was provided in the Energy and Water Development Act of 1998. In its Report (105-190) on the 1998 Energy and Water Development Appropriations Bill, the House of Representatives provided guidance in the following language:

Sacramento River and San Joaquin River Basins Comprehensive Study, California.—In response to the devastating floods of 1997, the Committee has added funds and directs the Corps of Engineers to conduct a comprehensive assessment of the entire flood control system within the existing study authorizations. . . These comprehensive investigations will include: (1) preparation of a comprehensive post-flood assessment for the California Central Valley (Sacramento River Basin and San Joaquin River Basin), (2) development and formulation of comprehensive plans for flood control and environmental restoration purposes, and (3) development of a hydrologic/hydraulic model of the entire system including the operation of the existing reservoirs for evaluation of the current flood control system. Not later than 18 months after the date of enactment of this Act the Secretary shall transmit an interim report describing results of the post-flood assessment and the assessment of the existing flood control system and its deficiencies.

STUDY SCOPE

This Post-Flood Assessment has been prepared in accordance with the Congressional Authorization to support the Sacramento and San Joaquin River Basins Comprehensive Study. The report describes recent (1983, 1986, 1995, 1997) major floods in the Sacramento and San Joaquin River basins and the extent of damages sustained and prevented. The analysis identifies system deficiencies, including locations of past failures, and estimates of property and populations currently at risk. To provide an understanding of the current flood management system and its operations during these recent floods, the historical development of flood protection as well other historical floods (prior to 1983) is provided. The current flood management system is described, including a summary of flood protection facilities and their operating objectives and constraints.

The report is organized in six chapters. Chapter 1 describes the need for the report and cites Federal and State of California legislative directives to proceed with the study. Chapter 2 provides a historical perspective of flooding and the development of flood protection in the Central Valley, from the mid-1800s to present. Chapter 3 describes the existing flood protection facilities in the Central Valley and their operating criteria. Chapter 4 provides an overview of the multiple agencies involved in the operation of flood protection facilities. Chapter 5 describes the effects of four recent floods in the Central Valley. For each event (1983, 1986, 1995, and 1997), storm and prestorm conditions are described, system breaks are identified, the extent of flooding is shown, and damages sustained and prevented are summarized. In addition, the results of a site-specific damage survey taken after the 1997 flood in Yuba County are presented. Chapter 6 summarizes problems with the existing flood protection system, the results of updated flood frequency analyses that include the last four major floods, and areas at risk of flooding. For each area at risk, agricultural and urban land areas, property values, and population at risk are summarized.



POST FLOOD ASSESSMENT FOR
1983, 1986, 1995, and 1997

**FIGURE 1-1
PHYSIOGRAPHIC REGIONS
IN CALIFORNIA**

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